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The geopolitics of African renewable energy

EUROPEAN AND CHINESE INVESTMENTS IN A GLOBAL GREEN TRANSITION

CLIMATE CHANGE

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For Europe, renewable energy is more than a way to reduce greenhouse gas emissions at home. It is a critical ingredient of the external dimension of the European Green Deal. Green transition in the EU, US and China, fuels a growing perception of competition for the African renewable energy market, and initiatives like the EU's Global Gateway are explicitly presented as an alternative to Chinese foreign infrastructure finance.

This paper examines this 'geopolitical competition' narrative in EU foreign policy. It looks at short and longer-term trends in African clean energy, the business models of European and Chinese engagement, and addresses some of the persistent myths on (Chinese) infrastructure investment in Africa.

It gives a reality check for the EU's engagement in African renewable energy and it makes recommendations for strengthening the EU's renewable energy cooperation with Africa. Both European and Chinese actors are trying to adapt to a greener global environment. This can create new forms of competition, but also opportunities for rapidly increasing capacity and access on the African continent. The EU will need to adapt both its rhetoric, and its business model to respond to the needs and constraints of African energy systems.

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Acronyms

AEEP	Africa-EU Energy Partnership
AfCFTA	African Continental Free Trade Area
AfD	Agence Française de Développement (French DFI)
AfDB	African Development Bank
AfSEM	African Single Electricity Market
AREF	African Renewable Energy Fund
AREI	Africa Renewable Energy Initiative
AU	African Union
B3W	Build Back Better World Initiative
BRI	Belt and Road Initiative
CARI	China Africa Research Initiative (John Hopkins)
CDB	China Development Bank
CDP	Cassa Depositi e Prestiti (Italian DFI)
CEEC	China Energy Engineering Corporation
CHEXIM	Export-Import Bank of China
COP26	UN Climate Change Conference
DFI	Direct Foreign Investment
EAPP	Eastern Africa Power Pool
EDF	Electricité de France
EDFI	European Development Finance Institutions
EGD	European Green Deal
EIB	European Investment Bank
EIP	EU External Investment Plan
EPC	Engineering, Procurement and Construction
ESG	Environmental, Social and Governance

ETTG	European Think Tank Groups
EU	European Union
EUMS	EU and Member States
EV	Electric Vehicle
FiT	Feed-in Tariffs
FOCAC	Forum ON China-Africa Cooperation
G7	The Group of Seven
GEEREF	Global Energy Efficiency and Renewable Energy Fund
GET.pro	Global Energy Transformation Programme
GGI	Global Gateway Initiative
GOGLA	Global association for the off-grid solar energy industry
GRAP	African Union Green Recovery Action Plan
GW	Giga-Watt
ICBC	Industrial and Commercial Bank of China
IDB	Islamic Development Bank
IEA	International Energy Agency
IMF	International Monetary Fund
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
JAES	Joint Africa - EU Strategy
KfW	Kreditanstalt für Wiederaufbau (German DFI)
KWh	Kilowatt-hour
LDC	Least Developed Country
LMIC	Lower Middle-Income Country
MDB	Multilateral Development Banks
MEE	Ministry of Ecology and Environment (China)
MFF	Multiannual Financial Framework
MOFCOM	Ministry of Commerce (China)
MW	Megawatt
NDICI	Neighbourhood, Development and International Cooperation Instrument
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PPA	Power Purchasing Agreement
PPP	Private Public Partnership

PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme (South Africa)
SAPP	South African Power Pool
SINOSURE	China Export and Credit Insurance Corporation
SME	Small Medium-sized Enterprises
SOE	State Owned Enterprise
TEI	Team Europe Initiative
UMIC	Upper Middle-Income Country
UN	United Nations
UNGA	United Nations General Assembly
US	United States
WAPP	West African Power Pool

Executive Summary

The EU has a dual interest in Africa's energy transition. It hopes to see Africa leapfrog past a carbon-fuelled development trajectory, but it is also looking to market its renewable energy technology abroad. African countries and leaders have a keen interest in leveraging the momentum for a global clean energy revolution to power the continent's industrialisation and development agenda. The EU, however, is not the only player that is invested in Africa's renewable energy potential. Technology-driven transition in the US and China, fuel a growing perception of competition for Africa's renewable energy market. Initiatives like the EU's Global Gateway are explicitly presented as an alternative to Chinese foreign infrastructure finance. This paper examines this 'geopolitical competition' narrative in the EU's evolving foreign policy agenda, zooming in on European and Chinese (renewable) energy investment in Africa. It looks at short and longer-term trends in African clean energy, the business models of European and Chinese engagement, and addresses some of the persistent myths and misconceptions on (Chinese) infrastructure investment in Africa. It offers a reality check for the EU's engagement in African renewable energy and makes recommendations for strengthening the EU's renewable energy cooperation with Africa.

Competing models or parallel worlds

The dominant narrative in European policy circles suggests a looming race for opportunities in African green infrastructure. In reality, European and Chinese actors have long used fundamentally different business models for African energy infrastructure, and have been working more in parallel than in direct competition in many countries.

The European footprint in African renewable energy is based on a developmental objective, and the use of public funding to crowd in private finance and capital. It focuses on competitive open procurement from independent power producers on the one hand and decentralised (off-grid and mini-grid) solutions on the other. Since the European Green Deal, the EU's approach to overseas renewable energy, however, is increasingly led by more proactive interests, sparked by an anticipation of future market opportunities for European technology, the move to a more interconnected European energy system, and a growing drive to secure critical raw materials for green transition.

Chinese investment in African energy infrastructure multiplied in the 2013-2018 period, focusing on sovereign debt financed construction deals for large scale fossil fuel, hydropower, and interconnection infrastructure. Since the COVID-19 crisis, however, there has been a steep drop in Chinese infrastructure commitments in Africa. Due to growing debt distress, Chinese infrastructure finance is also unlikely to bounce back to the levels or in the same shape as in the 2010s. At the same time Chinese overseas investment, and its state-owned construction and energy companies are adapting to a greener global environment. While China rapidly phases out support for overseas coal, renewable energy investments will be maintained and more likely expanded. In 2021 and 2022, it is also taking important new steps towards greening overseas investments and applying Chinese and international standards to Chinese foreign investment and construction projects, further paving the way for a greener Belt and Road.

Reality check

In the past few years, the notion of geopolitical competition has permeated all areas of EU external action, this is especially true for overseas infrastructure and energy diplomacy. Looking at renewable energy in Africa, the dominant rhetoric appears to suggest a greater level of direct competition than currently exists. Rather than a battleground between great powers, we observe that the needs and demands for external infrastructure finance vastly overstretch the offer of any foreign partner.

Between now and 2030 we will see a phase of rapidly expanding overseas renewable energy interests, which are largely driven by domestic dynamics and economic interests relating to energy transition in Europe, China and

beyond. The EU seeks to develop new and green technologies to accelerate its own transition, and will use public funding and its regulatory power to carve out its long-term vision of a regionally interconnected and technology-driven green growth. China, in turn, is the biggest renewable energy market globally. It dominates the manufacturing and critical raw materials value chains for both photovoltaic (PV) and battery storage, and will likely increasingly seek to leverage this overseas.

In the coming years, we will likely see an increasing convergence of the two models, driven by a more assertive push for European interests, changes in Chinese practice, and the greening of European, Chinese, and other sources of foreign investment. This can create new forms of competition, but also opportunities for a more pragmatic division of labour in overseas renewable energy, in the interest of rapidly increasing capacity and access on the African continent.

Recommendations

Africa's energy systems are now seen as an opportunity more than a development challenge, even if structural barriers continue to prevent the rapid scaling of both domestic and foreign investment needed to sustainably power the continent's economies. For the EU and its member states to gain the credibility they hope to project in African renewable energy, and to create the opportunities they claim to bring, the EU will need to adapt both its narrative and its business model.

A less defensive narrative entails:

1. Focusing on substance, not competition;
2. Emphasising 'just transition' over 'value-driven' investment;
3. Respecting alternative decarbonisation trajectories; and
4. Making better use of key diplomatic opportunities.

A stronger and more attractive business model requires:

1. Prioritising scale, speed and value for money;
2. Looking for complementarity instead of competition;
3. Addressing structural barriers and risk factors;
4. Further addressing fragmentation and visibility; and
5. Investing in new green jobs early on.

Introduction

For Europe, renewable energy is more than a way to reduce greenhouse gas emissions at home, it is a critical ingredient of the external dimension of the European Green Deal, the backbone of an interconnected transition with its direct neighbours and a key market opportunity for European businesses. The EU has a dual interest in the African energy transition. It hopes to see Africa leapfrog past a carbon-fuelled development trajectory, but it is also looking to market its renewable energy technology abroad. With vastly untapped energy resources, including solar, hydropower, but also natural gas, Africa's energy trajectory is seen as an opportunity as much as a developmental challenge. African countries and leaders also have a keen interest in leveraging the momentum for a global clean energy revolution to power the continent's industrialisation and ambitious African Continental Free Trade Area (AfCFTA) agenda, and address one of the most persistent bottlenecks for the continent's economic development.

Yet the EU is far from the only player that is invested in Africa's renewable energy potential. The EU's technology-driven transition plan, and similar dynamics in the US and China, fuel a growing perception of competition for Africa's renewable energy market. As China's Belt and Road Initiative (BRI) evolves and adapts to the new global economic reality, Western powers are launching 'competing' initiatives to counter Chinese infrastructure finance. In January 2021, the G7 announced the Build Back Better World (B3W) initiative, a US-led plan to mobilise millions of dollars in infrastructure investment for low- and middle-income countries (Crystal 2021). In December 2021, the European Commission launched its new 'Global Gateway Initiative' (GGI), a connectivity strategy to channel investments in infrastructure and connectivity services but also as a "trusted [EU] brand" of 'value-driven' cooperation around the world (von der Leyen 2021). These new initiatives are accompanied by an increasingly explicit criticism of China, and are presented as a 'counter-offensive' to the BRI¹.

This paper examines this 'geopolitical competition' narrative in the EU's evolving foreign policy agenda, and offers a reality check, zooming in on European and Chinese (renewable) energy investment in Africa. It looks at short and longer-term trends in African clean energy, the business models of European and Chinese engagement, and addresses some of the persistent myths and misconceptions about (Chinese) infrastructure investment in Africa.

It concludes that in the field of renewable energy infrastructure, the 'geopolitical competition' narrative is more a reflection of changing EU interests than of recent trends in infrastructure finance. The defensive and somewhat crude rhetoric on China's role in African infrastructure misunderstands how Chinese energy and construction companies operate in Africa, and is unlikely to create new opportunities for the EU. European and Chinese actors today tend to work in parallel, more than in direct competition. However, this may change in the near future as both are trying to adapt to a greener global environment. This can create new forms of competition, but also opportunities for a more pragmatic division of labour in overseas renewable energy, in the interest of rapidly increasing capacity and access on the African continent. In order to strengthen and scale up Europe's offer, the EU will need to adapt both its rhetoric, and its business model to better respond to the needs and constraints of African energy systems.

The paper focuses specifically on the role of the EU and China, looking both at utility-scale infrastructure and decentralised (off-grid, mini-grid, commercial and industrial) solutions. It provides an insight into broad trends and recent developments, with a purpose to inform policy-makers about the reality of foreign investment in African

¹ Other countries, including the UK have recently increased their commitment for clean energy investment in developing countries. With the 'clean green initiative' the UK plans to double UK green investment in developing countries to GBP3 billion, as well as provide new guarantees to support clean infrastructure projects (Kumar 2021)

renewable energy. It does not provide a market analysis, nor does it offer deep-dives into the dynamics of national energy systems. Clean energy development also covers a number of other important segments, such as clean cooking solutions, energy efficiency and sustainable cooling, which could not be covered here.

1. Trends in African renewable energy

Clean energy in Africa is a difficult paradox. On the one hand, the continent is home to some of the world's most promising untapped renewable energy sources (solar, wind and hydropower), as well as the minerals needed to produce green technologies in the first place (Bobba et al. 2020). On the other, many African countries have some of the lowest electricity access rates in the world. The International Energy Agency (IEA) estimated that in 2019, 580 million Africans were living without access to electricity, a number that with rapid population growth may further increase in the coming years (IEA n.d.). Underdeveloped, overstretched and inefficient energy systems also mean that many African countries face very high costs and low-cost recovery per Kilowatt-hour (KWh) (Tagliapietra 2017), making it even more difficult to increase generation capacity and connect underserved communities. Filling the ever-increasing gap between supply and demand also drives African governments and businesses to prioritise expensive, polluting and inefficient energy sources.

Energy in Africa, therefore, is less a climate issue, and first and foremost seen as a developmental challenge. With population growth set to double the continent's energy demand by 2040, increasing the supply and reliability of electricity is a key condition for attaining the continent's industrialisation and job creation ambitions. It is also intricately linked with the development of the African Continental Free Trade Area (AfCFTA). The AfCFTA can be a catalyst for the African energy sector by cutting red tape, facilitating regional cooperation and access to capital, technology and capacity (Adeniran and Onyekwena 2020). At the same time, scaling Africa's generation capacity is also a key enabler for the industrial development which is the backbone of the AfCFTA. Continued shortages until recently led many African countries to prioritise fossil fuel powered energy systems, and particularly coal, oil and gas. Today, there is growing recognition of the potential for renewable energy² to help the continent 'leapfrog' those technologies for a more sustainable and future-proof continental energy system.

Africa only contributes 4% of cumulative carbon emissions globally, yet it suffers the worst impact of climate change. African countries have long called for differentiated responsibilities and timelines for reducing greenhouse gas emissions. Faced with structurally insufficient financial and technical support from developed countries, African leaders therefore tend to oppose an accelerated shift to renewable energy, if it risks slowing down economic development. Natural gas in particular is seen as a key ingredient of African economic development, and one that will eventually benefit renewable energy investment in the longer term. UNECA for example estimates that doubling Africa's generation using only natural gas, would allow it to multiply investments in solar and wind 38 times, with just a 1% increase in global emissions (Adam 2021). New(er) entrants in the natural gas sector, like Mozambique and Tanzania, risk losing out twice in a wavering global investment climate for natural gas projects, once by not having had the opportunity for rapid fossil-fuel-based economic development, and a second time by not being able to exploit newfound natural gas reserves. African leaders also regularly speak out against the slowing down of finance for African natural gas, both in multilateral settings, and in the AU-EU format (Lo 2021a; Sall 2021).

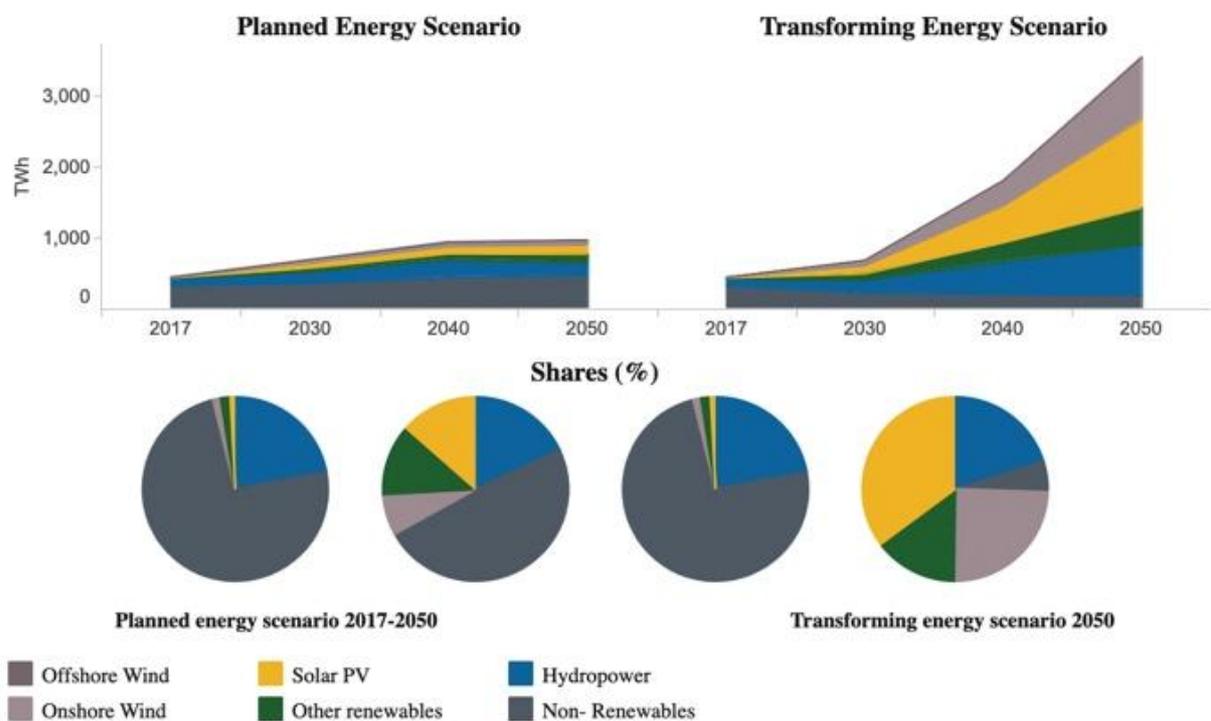
While Western powers are aware of the urgency to respond to the inherent injustice of energy transition in Africa, only moderate progress was made in terms of finance or mapping out the structure of 'just transition' to renewable energy at the COP26 Climate Summit in Glasgow (Africa Confidential 2021). The governments of South Africa, France,

² Large-scale hydropower also has a significant history in Africa, and remains a key priority in many countries, even if the support from many Western investors has become increasingly hesitant in the past decades.

Germany, the United Kingdom and the US, together with the EU announced a long-term Just Energy Transition Partnership to support South Africa’s decarbonisation efforts through increased finance from developed countries (EC 2021a). While this is an important step, the scale of energy needs on the continent continues to far outstretch the available finance and support.

Africa currently has a mere 50 Giga-Watt (GW) of estimated renewable installed capacity, 30 GW of which are generated from hydropower. While estimates indicate that Africa’s potential to generate renewable energy from existing technologies is 1,000 times larger than its projected demand for electricity in 2040, in 2018, only 20% of African electricity came from renewable energy sources (IRENA 2021a). Between 2010 and 2018 nearly \$100 billion was invested in the energy sector in Africa from which \$70 billion was invested in fossil fuels and only \$13 billion in renewables (IEA 2019). With few exceptions, energy expansion has historically been dominated by sovereign debt and development finance institution funding, and while private investment in African renewable energy is on the rise, committed amounts fall far short of estimated needs. According to the IEA (2019), reaching full access by 2030, and maintaining it to 2040 would require \$2 trillion in investment between 2019 and 2040, or more than \$100 billion per year. In addition to massively scaling up solar and wind power, a large part of this would also need to go to transmission and distribution infrastructure (IEA 2019: 461).

Figure 1: Electricity Generation and capacity in Sub-Saharan Africa



Source: IRENA n.d.

While installed capacity has increased very gradually, African energy systems are changing rapidly. In the coming decades, the following key trends will play a critical role:

1. **Increasing adoption of decentralised solutions:** The rapidly decreasing costs of solar photovoltaic (PV)³, combined with electronic and mobile payment systems, has led to a growing market for decentralised (off-grid and mini-grid) solar in many rural and peri-urban areas. Countries' approach to electrification is also increasingly shifting from grid expansion through traditional 'rural electrification' programmes towards a hybrid system, integrating and regulating decentralised energy in national policies and priorities.
2. **Adoption of renewable energy-specific market mechanisms:** African energy systems have a large participation of State-owned enterprises (SOEs) and vertically integrated utilities. Moving towards solar and wind expansion requires a high degree of modularity, and a larger number of smaller power plants. This also means that working with Independent Power Producers (IPPs) is becoming increasingly viable and better regulated, especially in Southern and East Africa. Feed-in Tariffs (FiTs)⁴ and renewable energy auctions (where IPPs bid for long-term contracts with utilities) only cover a small share of electricity generation, but they are seen as an opportunity to drive down the price of renewable electricity, while reducing public (and debt-financed) expenditure for infrastructure development (IRENA 2018; Nyabira 2021)⁵.
3. **Growing regional interconnectivity:** African countries and development partners are investing in cross-border interconnections and regional energy market governance systems in several African regions (Medinilla et al. 2019). Most interconnections are based on long-term bilateral Power Purchasing Agreements (PPAs), which give greater security, yet regional market mechanisms under the Southern, East, and West African power pools (SAPP, EAPP, WAPP), can be critical ingredients for scaling renewable energy generation regionally in the near future. 2021 also saw the launch of the African single electricity market (AfSEM), a long-term roadmap and governance mechanism to develop a continent-wide electricity market by 2040 (van den Bergh 2021).

Given the low level of (non-hydropower) renewable energy in many African countries, these trends take place somewhat in the margins of the national energy systems concerned. South Africa, for example, which alone accounted for two-thirds of the renewable energy investment in the continent between 2014 and 2018 period (IEA 2019), still gets 91% of its energy from fossil fuels and primarily coal (Chiyemura et al. 2021: 18). Country- and locally-driven renewable energy initiatives like South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), however, show a promising direction of travel for African renewable energy, and have the potential to accelerate considerably if the overall investment climate for solar and wind further improves.⁶

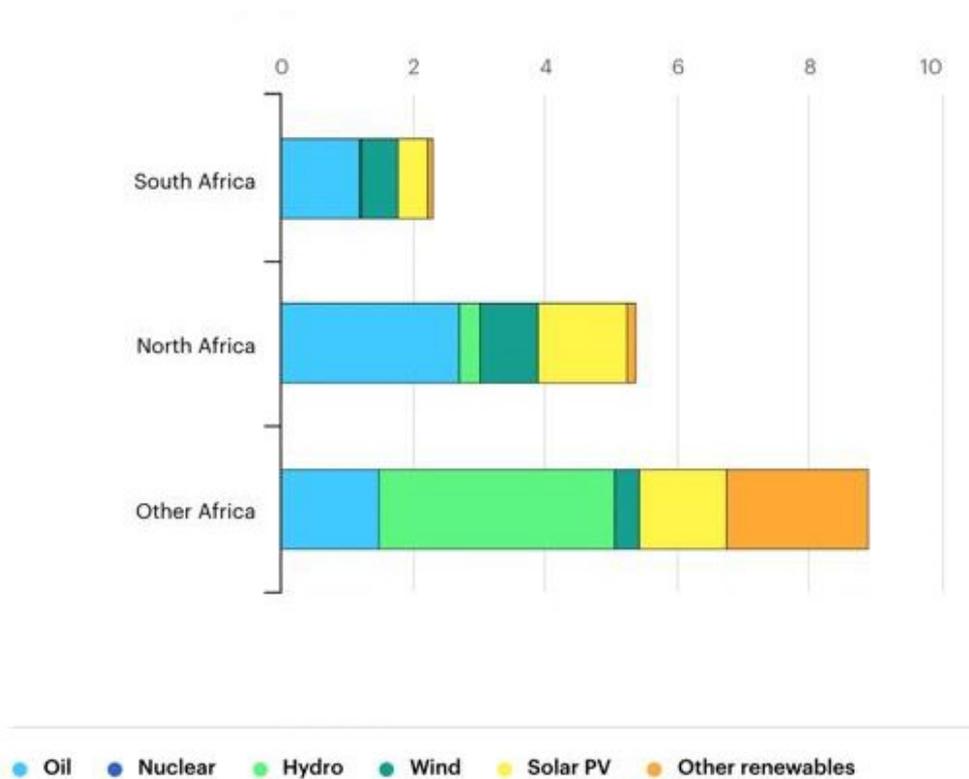
³ While the competitiveness of any energy source depends on local environmental, political and economic conditions, on average, the costs for electricity from utility-scale solar photovoltaics (PV) fell 85% between 2010 and 2020, while solar and wind power costs also increasingly undercut the costs of the cheapest coal fired power plants (IRENA 2021b)

⁴ Feed-in Tariffs (FiT) are a policy instrument to promote renewable energy generation, providing a guaranteed, often above market price for Independent Power Producers (IPPs) over a number of years. Several African countries have implemented FiTs over the years, including Tanzania, Kenya, Algeria, Uganda, Ghana, and South Africa.

⁵ South Africa, but also Uganda, Zambia and Kenya have either active auctions schemes, or are in the process of setting this up.

⁶ Currently, Africa only has 5 GW of installed solar capacity (IRENA 2021a), compared to a total estimated potential of 315 GW by 2040, as envisioned by the African Union 2063 Agenda and the IEA African Case scenario (IEA 2019).

Figure 2: Investment in generation capacity in 2020 (in 2019 USD billion)



Source: IEA n.d.

At the continental and regional policy levels, the ‘leapfrogging’ narrative is increasingly taking root, spearheaded by new net-zero commitments like in Nigeria (Lo 2021b) and the prospect of new green energy jobs and development opportunities. A coal phase-out is currently also underway in several countries (see section 2.2 below), potentially creating further space for renewable energy deployment⁷. Securing African benefits in a global green transition is also the tenet of initiatives such as the 2021 African Union’s Green Recovery Action Plan (GRAP)⁸ (African Union 2021), and previous initiatives such as the 2016 Africa Renewable Energy Initiative (AREI). The African Development Bank (AfDB) in particular has sought to grow finance for African renewable energy, launching its New Deal on Energy for Africa in 2016 with the aim to achieve universal access to energy by 2025 (AfDB n.d.). In 2017, the Bank achieved 100% renewable energy in its energy portfolio approving power generation projects with a cumulative 1,400 MW from renewable energy in the same year (AfDB n.d.).

Outside observers tend to see Africa’s renewable energy sector as being in the calm before the storm, full of future opportunities. The barriers for a rapid and large-scale rollout of solar and wind power, however, remain significant. Solar and wind expansion in many African countries continues to rely on a high degree of concessional and grant finance. High financial risk, often ill-adapted regulatory systems, and persistent transmission and distribution deficiencies, also risk deterring private investors and putting a hard ceiling on the amount of finance that can be crowded in the short term. Growing debt distress on the continent also seriously affects the ability of African countries to continue borrowing to finance their infrastructure, and carry the high upfront costs of large-scale energy projects. This risks further slowing down Africa’s energy development if not addressed.

⁷ In 2020, for example, Egypt deferred the construction of the Hamrawein 6,000MW coal-fired power plant, to prioritise renewable energy investment (IEEFA 2020).

⁸ The Green Recovery Action Plan (GRAP) lists renewable energy as two of its five joint priority areas.

2. European and Chinese engagement in African renewable energy

2.1. Competing development narratives

Initiatives like the GGI are in the first place an exercise in framing. In her 2021 State of the European Union Address, European Commission president Ursula von Der Leyen announced the Global Gateway Initiative (GGI) by saying: “We are good at financing roads. But it does not make sense for Europe to build a perfect road between a Chinese-owned copper mine and a Chinese-owned harbour” (von Der Leyen 2021). Soundbites like this have become increasingly common in official EU rhetoric. They reflect changing EU foreign interests, but can also be seen as an expression of a deep-rooted sense of loss of control in the relations with developing countries it has always considered as part of the EU’s direct sphere of influence.

The GGI is not only presented as a ‘competing bid’ to the Chinese offer for the world, but also one that respects the “highest social and environmental standards”, and is “in line with the EU’s democratic values and international norms and standards” (EC 2021b). These are statements that only hold meaning in contrast with a perceived opposite model, one that is ‘un-democratic’, ‘in violation of international norms’, and ‘detrimental to the environment’.

This narrative of a fundamental rather than a simply commercial competition also tends to ignore the key issue of how European cooperation, investment and diplomacy is perceived in developing countries and in the rest of the world. Following its launch in 2013, the Chinese Belt and Road Initiative (BRI) was hailed as an alternative to the Western international development model, which despite the often invasive conditionalities and reform requirements, had failed to create the promised levels of economic development and prosperity. For many African countries, the BRI not only offered an opportunity to quickly fill in critical and long-standing infrastructure gaps, its non-interference and equal partnership narrative was also seen as a welcome break from Western practice. Opinion polling on the role of China in Africa also shows a continued trend of favourable opinions towards the influence Chinese presence has on African societies (Appiah-Nyamekye Sanny & Selormey 2021).

With 46 African countries signed up to the BRI, and a total of \$153 billion in loans committed to the continent between 2000 and 2019 (CARI and BU 2021), there has been ample pressure on the EU (and US) to come up with an alternative to the original alternative. The answer so far, however has been a mix between emulating certain practices (e.g. focus on infrastructure finance, more protection and policy support for EU businesses⁹, and a stronger emphasis on the normative and ecological aspects of EU cooperation and investment). While the GGI communication promises significant investments of up to €300 billion it does not mobilise additional financial resources but rather repackages existing financial commitments. Given the long history of the EU and member state (EUMS) presence in Africa, compared to China, the ‘alternative’ model of the EU has initially been met with significant skepticism in African capitals.

The following sections look beyond the narrative of geopolitical competition and examine how European and Chinese actors actually engage in Africa’s energy sector. They look at available data on investments, modalities and business models, and identify new and ongoing trends in European and Chinese engagement in the sector. This provides the basis for a much-needed reality check of the geopolitical competition narrative in section 3 below.

⁹ Including, for example the proposed EU export credit facility (Valero 2021).

2.2. European interests: from a development aid to market access

In addition to a historical reliance on oil and gas from Nigeria, Algeria, Libya, and Angola, the focus of EU and EU member states' direct engagement in African energy systems has long been driven by the developmental objective of increasing electricity access using development aid. Since the 2000s, EU support has increasingly sought to leverage private finance for African (renewable) energy and has diversified its portfolio of financial and policy instruments considerably. The European Green Deal and 2021-2027 Multiannual Financial Framework (MFF) mark a new chapter in the EU's renewable energy ambitions, both in terms of (future) scale, and new, more proactive interests of the EU in overseas renewable energy.

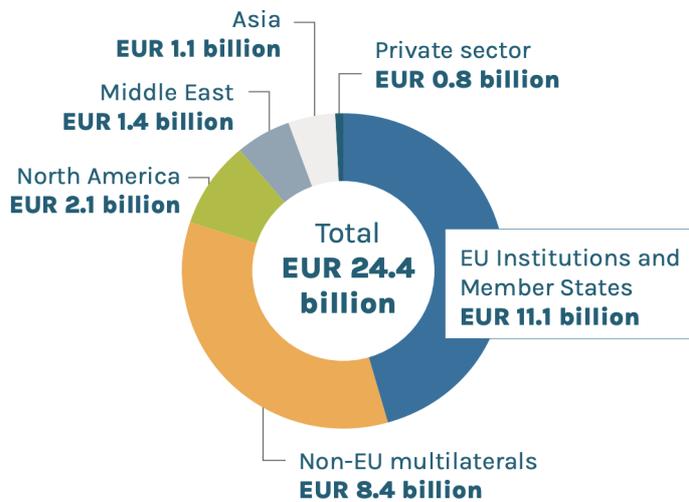
Energy has been a formal priority for the AU-EU partnership since the launch of the Joint Africa-EU strategy (JAES) in 2007 (AU & EU 2007), which also established the Africa-EU Energy Partnership (AEEP), an intercontinental interface which unlike many other areas of EU-AU cooperation has maintained a continuous political dialogue. In the past few years, climate action also became a more central area of focus of the partnership, primarily driven by the EU, and has increasingly moved the emphasis of EU-Africa energy discourse from 'energy security and access' to 'sustainable and clean energy'. While the AU-EU process provides useful diplomatic framing, European (renewable) energy finance, however, is far from centralised, and takes place through a wide range of public and private initiatives, both through EU and member state channels, discussed below.

The EU institutions and the EU member states currently make up almost half of the Official Development Assistance (ODA) commitments linked to Sustainable Development Goal (SDG7) (Affordable and Clean Energy) in Africa (AEEP 2021). Aggregate figures for EU funding show that between 2014 and 2019, EU ODA to African Energy surpassed €11 billion. This includes a significant portion of grant funding (34%), while European ODA loans also show a high degree of concessionality. In African Least Development Countries (LDCs) the grant component is significantly higher than in Lower Middle-Income Countries (LMIC) and Upper Middle-Income Countries (UMICs).

Data on private finance is less reliable, yet the AEEP identified a total of €3.4 billion in equity investment and a further €5.1 billion in commercial loans from European creditors (AEEP 2021). European private finance by and large favours solar and wind power generation, consisting of both IPP and decentralised energy projects. It also shows a high degree of concentration in South Africa, which has the continent's largest functioning renewable energy auctions scheme (REIPPPP). Other private flows favour a handful of middle-income countries including Morocco, Egypt, Kenya, Senegal and Cameroon (AEEP 2021). Given the policy directions of the EU, European private investors are also likely to be increasingly wary of investing in overseas fossil fuels, particularly oil and coal, as most anticipate a continued push towards sustainable investment standards (see below).

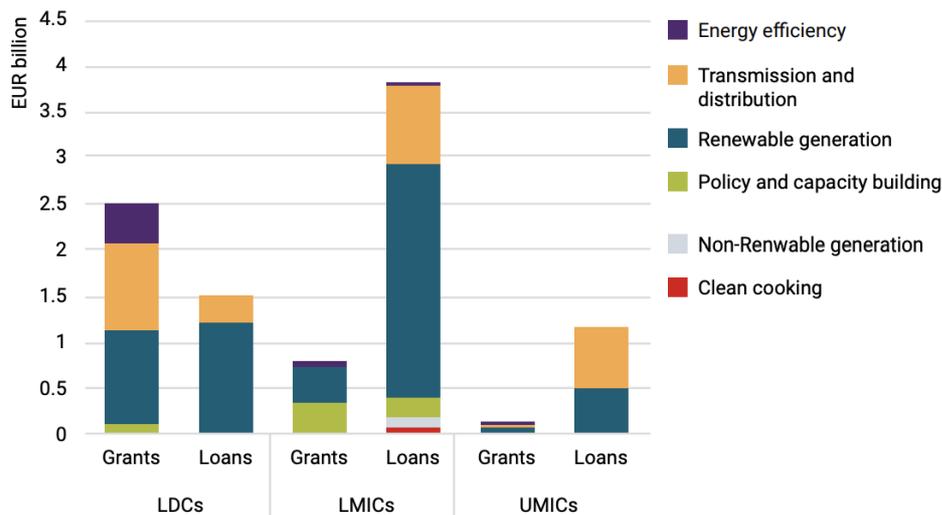
Overall, the EU's engagement over the past two decades, has been geared towards comprehensive energy systems reforms for a liberalised approach to renewable energy and an enabling environment for scaling investments. This has inspired much of the support for regulatory reforms and better governance of the electricity sector, both through continental and regional organisations, and bilateral sectoral programmes (EC 2018). EU support for utility-scale renewable energy in particular targets the development of competitive bidding schemes in which independent power producers (IPPs) are the backbone of a growing and increasingly modular energy system.

Figure 3: ODA commitments to SDG7 in Africa (2014-2019)



Source: AEEP 2021

Figure 4: Breakdown of EU institutions and member state ODA commitments (2014-2019)



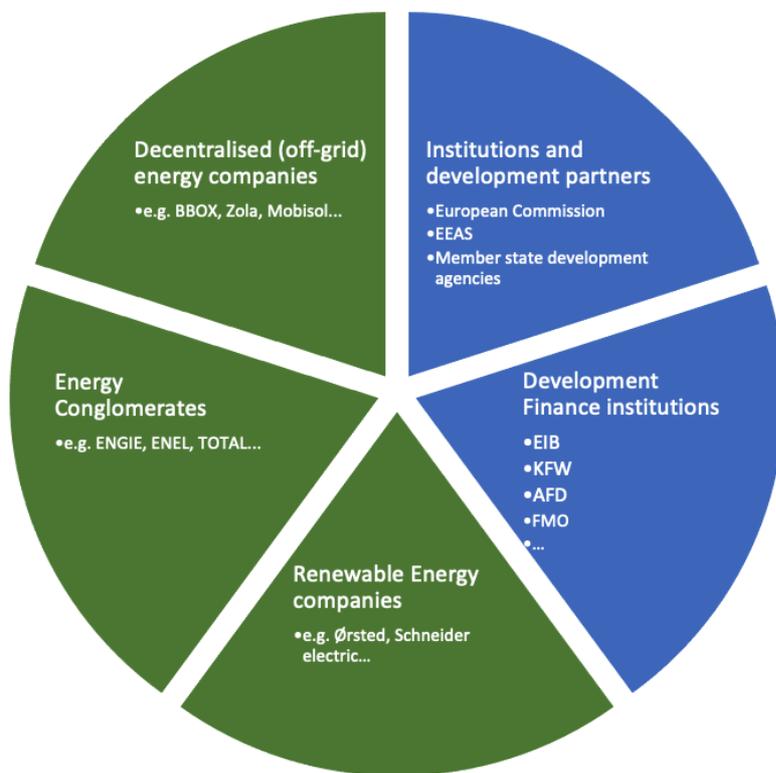
Source: AEEP 2021

Leveraging private finance, policy dialogue and technical assistance

The EU's approach financing renewable energy changed over time. Initial EU support relied heavily on grant funding, sometimes accompanying concessional MDB finance. This approach, however, proved difficult to scale up and sustain, since it relied primarily on public funding. In the 2000s and 2010s the EU moved towards blended finance, using grants to mobilise additional finance from public and/or private sources (Grosse-Puppendahl et al. 2017). The

EU has also set up several specific financing instruments for pooling and channelling resources, including EDFI-Electrifi (2015),¹⁰ which invests in early-stage companies and projects to improve access to energy particularly in rural areas (EC 2017). Between 2007 and 2018, nearly half of EU blended finance in Sub-Saharan Africa was linked to energy.¹¹ While ‘blending’ can create opportunities for increasing energy access in high-risk environments, it is less well adapted to reaching remote and poor areas (including least developed countries) because of the high-risk perception relating to political and economic factors (Grosse-Puppendahl et al. 2017). This led to an increasing reliance on guarantee schemes (instead of grants) in EU blended finance activities, as a way to mitigate risks and attract private investments. The 2017 EU External Investment Plan (EIP) uses both grants and financial instruments (loans and guarantees) to crowd in private capital, and has led to energy-specific initiatives like the 2019 African Energy Guarantee Facility (AEGF), providing guarantees and reinsurance services, managed by the European Investment Bank (EIB), Kreditanstalt für Wiederaufbau (KfW), Agence Française de Développement (AFD), and Cassa di Risparmio di Firenze (CRF) (EC 2019a). ‘Blending’ and guarantees are also an integral part of the new NDICI-Global Europe’s investment framework, which will be backed by a €53.4 billion External Action Guarantee (EC 2021c).

Figure 5: different EU actors in African renewable energy



Source: Authors

While the EU’s engagement in renewable energy very much hinges on finance and investment, it also relies on policy dialogue and technical assistance (EC 2017) to try and achieve systemic change and sustainable impact in the

¹⁰ Electrifi is an EU collaboration with the US’ PowerAfrica initiative and Sweden that currently manages €253 millions of funding, 66% of which goes to Sub-Saharan Africa (EDFI n.d). Other notable initiatives include the Global Energy Efficiency and Renewable Energy Fund (GEEREF), seed funded by the EU, Germany and Norway between 2008-2015, and the GET.invest platform, which currently provides matchmaking and advisory services to facilitate access to finance for Energy projects.

¹¹ The European Commission estimates that blended finance operations have led to 10 million people gaining access to electricity between 2007 and 2016, 60% of which were in low-income countries (EC 2018).

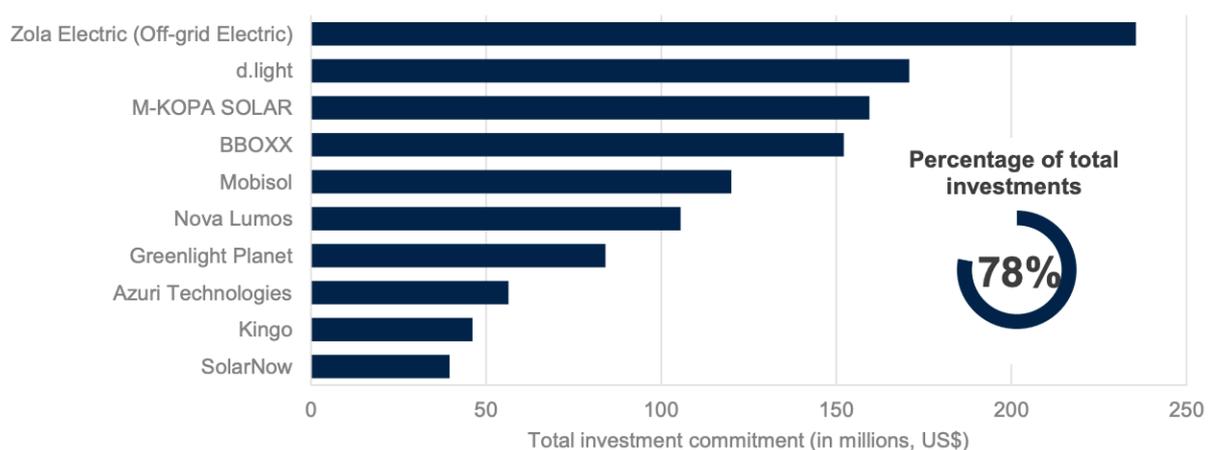
renewable energy sector. Technical assistance is seen as a way to help companies develop reliable and sustainable technologies, but also viable business models and bankable projects. This can again attract additional financing from DFIs and private investors. The EU also provides sectoral support and advisory services to further facilitate private sector involvement and has set up a range of (global) facilities to that end. Since 2018, several such facilities are grouped under the GET.pro platform, funded by the EU and a number of EU member states, which also houses the AEEP secretariat (GET.pro 2021).

The EU and its member states have developed a substantial portfolio of both financial and technical/political instruments for promoting renewable energy in Africa, yet it also presents a somewhat fragmented picture of initiatives, facilities and funding sources (Tagliapietra 2017). This confirms common African concerns with the often convoluted, and difficult to coordinate network of European actors. Initiatives like Electrifi, but also the AEEP and GET.pro have gone a long way in developing a stronger EU-plus-member states profile in energy finance, yet they are still far away from a one-stop shop. The recent overhaul of the EU’s financial architecture seeks to remedy this while also creating a stronger ‘Team Europe’ (EU plus member states) offer.

Focus on decentralised solutions

The focus on leveraging private finance with grant funding has allowed European DFIs and private sector actors to establish a clear basis in renewable energy IPPs, but also in decentralised energy solutions (off-grid, mini-grid, solar home systems and other stand-alone systems). European companies’ market share in off-grid solar in Africa is difficult to track, yet European-based companies are among the largest providers of pay-as-you-go services (PayGo). Alongside European based solar start-ups like BBox and Azuri, major energy companies like Engie, TotalEnergies and Électricité de France (EDF), are increasingly active in off-grid markets. Recently a degree of consolidation has been underway, with Engie in particular acquiring companies like Mobisol and making significant equity investments in key off-grid players like BBOXX and Kingo. The global association for the off-grid solar energy industry (GOGLA) sees consolidation as a cause for concern, as around 10 companies (see figure 6) now control nearly 80% the off-grid solar landscape worldwide (GOGLA 2020; Lighting global et al. 2020; Corbyn and Fortes 2021). Half of these companies have a European base (EU/UK), while there is significant European equity participation in several others.

Figure 6: Top 10 recipients by Total Investment Commitments from 2012 to 2019



Source: Lighting global et al. 2020

The relative share of DFI financing (vis-à-vis equity, loans and occasional grant funding) for decentralised energy solutions has also increased, with off-grid solar reaching 40% of DFI financing globally in 2018 (GOGLA 2019). The EIB is also committed to further growing decentralised energy finance as part of its fossil fuel phaseout (EIB 2019). Scaling decentralised energy in Africa will remain a key objective for the EU and member states in the coming years, and support for mini- and off-grid solutions was also specifically flagged in the resolution establishing the EU's new main international cooperation instrument, the NDICI-Global Europe (EC 2021d).

Shifting overseas energy priorities: the European Green Deal

EU support to African renewable energy in the 2000s and 2010s was based on a broad developmental narrative, backed by substantial, albeit somewhat fragmented development finance. With the European Green Deal, EU interests in overseas renewable energy have shifted. The premise of a technology-driven green growth comes with stronger and more proactive interests in renewable energy abroad. In relation to Africa, critical dynamics include:

1. **Anticipation of future market opportunities:** As the European renewable energy industry, particularly wind and solar, is set to grow rapidly and exponentially with ample public support, the largely underdeveloped African market both for utility-scale and decentralised systems provides a long-term opportunity for European companies. Rapid developments, particularly in North, East and Southern Africa are already attracting significant attention, and European companies are moving into position, both in the on-grid and decentralised energy segments. In West Africa support for large-scale solar is also picking up, with the AfDB-led desert-to-power initiative¹² attracting new commitments from the Green Climate Fund (GCF) alongside several EU member states (AfDB 2021).
2. **A more regionally interconnected European energy system:** Europe's grids were built around traditional fossil fuel and nuclear power plants. Wind and solar power require a higher degree of modularity and interconnectivity, including with the EU's neighbouring countries. The only existing interconnection between the two continents is between Spain and Morocco (currently providing power from Europe to Africa), but several other countries are in the process of negotiating deals¹³. Along with Tunisia, Morocco is also seen as a promising, low-risk environment in which green hydrogen production for European consumption can be developed in the mid-to-long term (Bennis 2021)¹⁴. Green energy integration with North Africa is also a clear priority in recent regional strategies that were launched after the European Green Deal in 2019. The 2021 'New Agenda for the Mediterranean', for example, proclaims "unparalleled opportunities for clean energy cooperation, with hydrogen production as a new strategic priority". It references 15 possible interconnection clusters, and aspires to build "at least 40 GW of electrolyser capacity by 2030", (EC 2021e; Med-TSO 2020).
3. **Securing critical raw material (CRM) interests:** rapid scaling of renewable energy and fuel cell technology requires access to critical raw materials, some of which are in short supply (Bobba et al. 2020). Less than 2% of the minerals needed for PV production, batteries, fuel cells, turbines, but also robotics are currently produced in the EU, and in segments like permanent magnets used in wind turbines, EU dependence on Chinese imports is close to 100%. This has led to increasing calls from both industries and the European

¹² The Desert-to-power initiative is a facility that seeks to build a 10GW solar generation capacity across Burkina Faso, Chad, Mali, Mauritania, and Niger by 2030 with a combination of public, private, grid and off-grid projects (AfDB 2021). The project is seen to be a key component of the great green wall, and crucial to relieve pressure of limited forestry resources in the region (Felix 2021).

¹³ Greece and Egypt are also in talks about an interconnector, which could potentially even connect the coal dependent Western Balkans to North African solar power (Todorović 2021)

¹⁴ Germany is currently working with Morocco to develop Africa's first industrial plant for green hydrogen, with intention of future exports to Germany (Teevan et al 2021; Leonard et al. 2021).

Parliament to prioritise and diversify CRM supply (Gauß et al 2021; Szczepański 2021). Africa presents opportunities for European producers, especially for cobalt and lithium, key minerals for battery production. Yet it also presents new challenges since Chinese companies, which currently dominate battery production, have already started consolidating access to mineral supply (see section 3 below). European CRM demand is set to multiply in the coming years, and will be a key driver of EU's engagement with third countries, including in Africa.

The push for green transition is also a driving force behind commitments in the new NDICI-Global Europe instrument, which includes a minimum spending target of 30% for climate action (including but not limited to renewable energy) (EC 2021c). These more 'proactive' EU interests are also likely to be a major focus of the upcoming EU strategy on International Energy Engagement, which is planned for the first quarter of 2022 (EP 2021). The new narrative of African renewables as an opportunity rather than a development challenge comes back in the EU's rhetoric on infrastructure investment. While the 2021 Global gateway initiative is criticised as a 'traditional' EU repackaging of existing funds (Charlemagne 2021; Bilal et al. 2021), it also shows the EU's intent to scale up private finance, while reducing fragmentation through the Team Europe approach¹⁵. The GGI can be seen as a recommitment to the EU's existing business model, and an ambition to make it work better. For energy finance, guarantees will be a key instrument for the EU¹⁶.

On the whole, the EU's business model for African renewable energy has an established, yet somewhat fragmented basis. With Team Europe branded initiatives like the GGI, the EU is trying to increase its visibility and coherence. NDICI funded Team Europe Initiatives are not yet publicly announced, but are also likely to feature several clean energy initiatives. These are important steps in clarifying the EU's 'offer' to African counterparts. Increasing ambitions in overseas infrastructure development will likely lead to accelerated investment in renewable energy, yet given the large financing gap in the sector, it will be a challenge to mobilise resources that meet current needs. The EU's approach to leveraging private finance for African renewable energy has potential in a growing market, yet guarantees and blended finance alone are not able to resolve the structural limitations inherent to African energy systems, including offtaker¹⁷ risk, industrial/productive demand, and overstressed national budgets.

At the same time worldwide investment trends increasingly appear to shift away from fossil fuel exploration and production towards renewables.¹⁸ Stronger policy directions on sustainable investment standards are also rapidly developing, with the EU taking a lead with its taxonomy for sustainable activities (EC 2022). Within Europe and beyond, perceptions of sustainability are changing from seeing Environmental, Social, and Governance factors (ESG) as an issue of risk management to a possible driver of long-term value (Farmer 2021). Even if the current draft Taxonomy allows some gas and nuclear projects to be classified as green¹⁹, the long-term perspectives and incentives for European investors in African energy are shifting increasingly to renewable energy.

¹⁵ The 'Team Europe approach' emerged from the COVID-19 pandemic response as a way to better coordinate the responses of the EU, its member states, their development agencies and European DFIs. It has since become an integral part of DICI-Global Europe through Team Europe Initiatives, which are projects and programmes jointly carried out by EU, member states and the financial institutions in various areas (Sergejeff et al. 2021).

¹⁶ The GGI also comes with a more modest target of leveraging €135 billions of private investment on the basis of €40 billions of EU guarantees (factor of 3.4), compared to previous announcements like the 2018 'Junker alliance' (factor of 15) (Tagliapietra 2021).

¹⁷ Offtaker risk refers to the risk that an offtaker, often a utility, will not honour its commitments and delay or default the contractual payments to power producers. (Atal et al. 2018)

¹⁸ The 2021 IEA World Energy Investment report noted a rebound in global energy investments of around 10%, bringing global energy investment close to pre-pandemic figures. Compared to fossil fuels renewable energy investments had continued to grow, largely due to major markets like China and the EU.

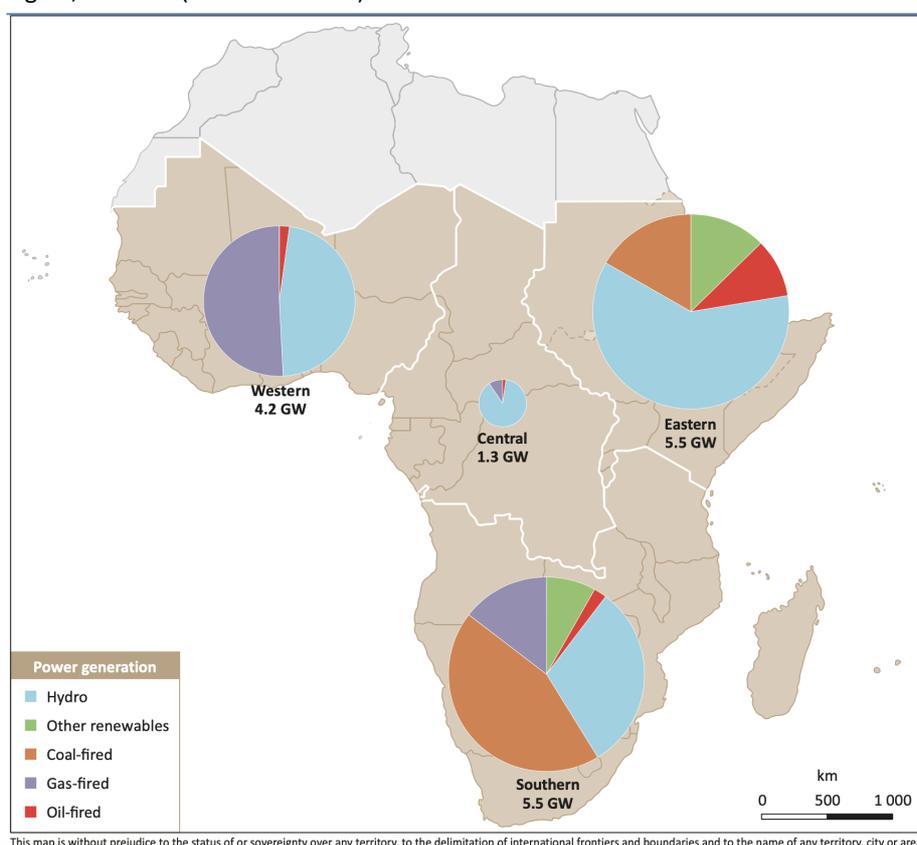
¹⁹ The move from the European Commission to allow for classifying gas and nuclear as a transitional source has been widely criticised by the expert community, civil society and even investors (Simon 2022; CAN 2022; Taylor 2022), yet it has been welcomed by African leaders and energy sector representatives (African Energy Chamber 2022).

2.3. China: towards a greener Belt and Road

Chinese interests in the African Energy sector increased significantly in the decades ahead of the launch of the Belt and Road Initiative (BRI) 2013. They have also gone through a number of fundamental shifts in the past two decades.

Under the ‘going out’ policy since 1999, Chinese engagement in African energy was primarily driven by its own domestic demand for fossil fuels, in the first place crude oil, to power the rapid economic developments at home (Shen 2021a). While Angola remains an important strategic oil exporting partner to China, imports from Africa, relative to other parts of the world started dropping in the mid 2010s, in favour of Russian, Middle Eastern, and Latin American production (Reale et al. 2020)²⁰. In parallel, Chinese investment in electricity generation on the continent started picking up, not least following the launch of the BRI in 2013. Chinese investment in utility-scale generation capacity, particularly in coal and large-scale hydropower, but also gas fired power plants and transmission infrastructure grew considerably in the 2010s (see figure 8 below).

Figure 7: Distribution of Chinese projects in power capacity in Sub-Saharan Africa (excluding North Africa), by sub-region, 2010-20 (data from 2016)



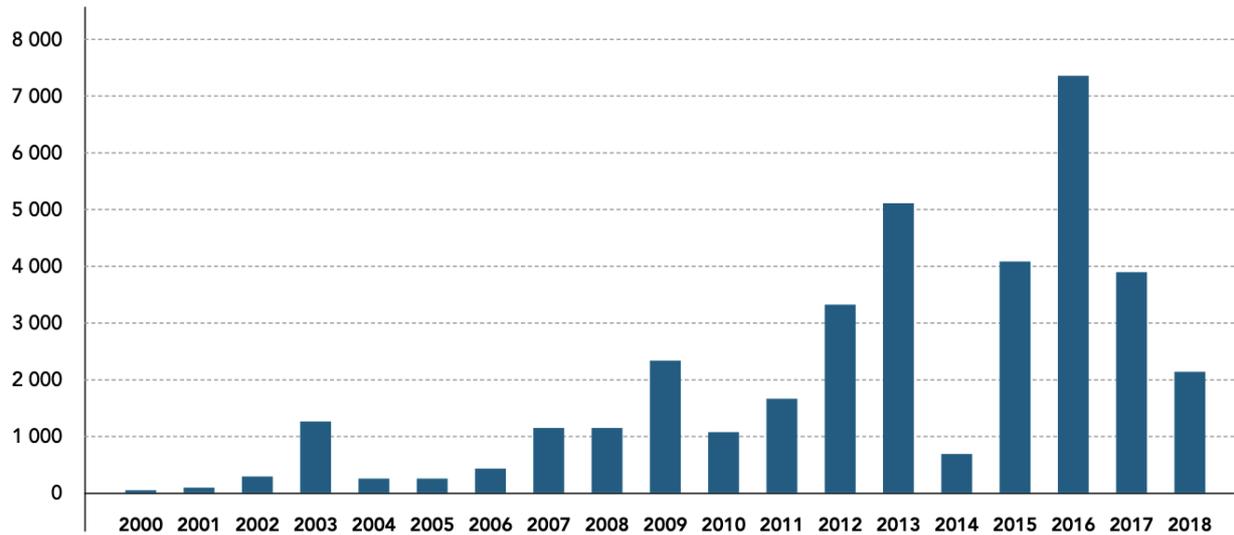
Source: IEA 2016

The bulk of Chinese finance for such infrastructure projects is channelled through the two main ‘policy banks’, the China Development Bank and the China Exim bank, while the China Export & Credit Insurance Corporation (SINOSURE), provides support or guarantees for loans in higher repayment risk environments (Shen 2020: 10-11). The Boston University’s ‘China’s Global Energy Finance Database’, tracks 89 projects financed by China Development

²⁰ Oil imports from Africa further saw a steep drop in the past couple of years, a trend that is unlikely to reverse, given the ongoing shift in domestic consumption (Zhou 2021).

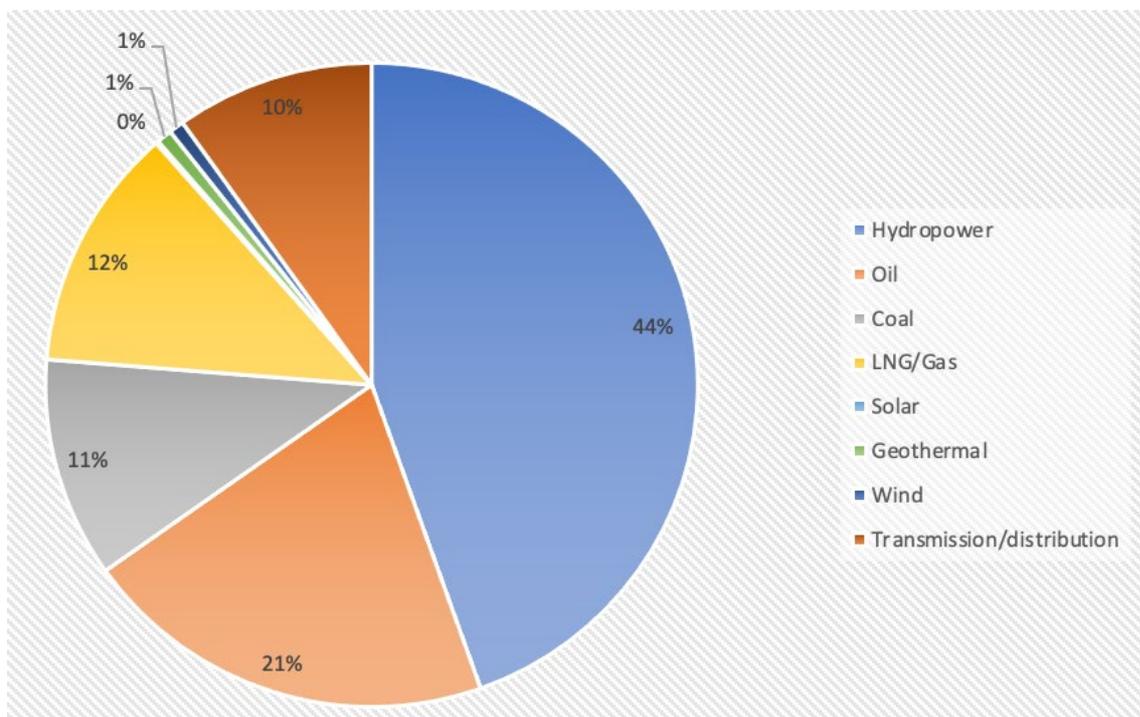
Bank (CDB) and China EXIM bank between 2000 and 2020 for a total of \$53.1 billion in loans, of which hydropower and fossil fuels account for \$46.6 billion (Global Development Policy Center 2021a).

Figure 8: Chinese loans to the African power sector in millions of USD (2000-2018)



Source: Johns Hopkins University China-Africa Loan Database, in: Chiyemura et al. 2021

Figure 9: CDB and China EXIM bank loans in African countries by project energy source (2000-2020)



Source: Global Development Policy Centre 2021b

Chinese engineers: power and business model of State-Owned Enterprises (SOEs)

Chinese energy finance has gone hand-in-hand with a growing presence of Chinese contractors in Africa's electricity sector. An estimated 30% of the installed capacity in Sub-Saharan Africa between 2010 and 2015 was constructed by Chinese contractors (IEA 2016). These are often large State-Owned Enterprises such as the Power Construction Corporation of China (PowerChina)²¹, Energy China (CEEC), the Three Gorges Corporation (TGC), and China National Machinery Industry Corporation (SINOMACH), which have consolidated many Chinese overseas contractors over the years. These companies are behind many of the large-scale hydropower and coal fired power plants constructed in the past decades, and enjoy strong backing from Chinese DFIs and commercial banks such as the Industrial and Commercial Bank of China (ICBC)²². They also tend to rely on a fairly standardised model of bilateral Engineering, Procurement and Construction (EPC) contracts.

As State-Owned Enterprises (SOEs), these companies enjoy significant support through the Chinese diplomatic architecture and are able to pursue close ties with African governments, operating at the highest level of political power (Shen 2020). While this is certainly not unique to Chinese business practices, this setup lends itself exceptionally well for large-scale and sovereign debt-financed projects, such as large hydropower installations and coal or gas fired power plants. Chinese contractors are able to offer package deals for delivering utility scale infrastructure, often faster than arrangements with Multilateral Development Banks (MDBs) or Western donor funding.

Box 1: Common (mis)perceptions of Chinese construction companies in Africa

A common criticism by Western observers is that Chinese infrastructure projects produce more limited local benefits, and instead rely on Chinese labour, which critics argue deprive locals of job opportunities and skills transfer (French 2014). Recent research, however, has largely dispelled this myth showing that there is no notable difference in local employment between Chinese and other foreign companies in the construction and manufacturing sector, nor a significant difference in employment conditions and training (Oya & Schaeffer 2019; Development Reimagined 2020). Instead, local policies and labour market dynamics appear to play a much more significant role than the origin of the companies in question. CARI, which tracks Chinese labour migration data in Africa also sees a decline in the number of Chinese workers in Africa since 2015 (CARI n.d.; Idris 2021).

In the case of hydroelectric dams, Chinese projects are also criticised for accepting lower standards in terms of their environmental and social effects (International Rivers 2019). Unlike Western development finance, Chinese construction companies in the hydropower sector tend to rely on host-country rules, regulations and governance systems, which also results in major differences in the environmental, social and governance (ESG) implications of projects (Murg et al. 2021). Growing Western reluctance to finance large-scale hydropower, means that the relative share of Chinese hydropower investments is likely to continue to grow. In terms of ESG, however, there are also clear signs of a learning curve by Chinese companies, and recently also the introduction of more centrally set standards (see below).

By contrast, African perceptions of Chinese infrastructure development in Africa only partially echo the often negative tone in Western political discourse and media reporting. A recent survey by Afrobarometer shows that the influence of China on African countries is generally seen in a very positive light (Appiah-Nyamekye & Selormey 2020). In the renewable energy sector, Chinese contractors are also perceived to deliver projects more flexibly (and in some cases at a lower cost) than Western-based contractors (Chiyemura et al. 2021).

²¹ PowerChina is also the parent company of SinoHydro, which among many others delivered the Bui Dam in Ghana and is the lead contractor on the 600MW Karuma Hydroelectric Power Station currently under construction in Uganda

²² ICBC is China's largest state-owned commercial bank, and has a significant footprint in Africa.

The business model of Chinese engineering and construction companies, however, has shown to be less adaptable to non-hydropower renewable energy deployment, which, even for utility-scale projects, is often made up of a greater quantity of smaller infrastructure projects. This may help explain the very low share of solar and wind power capacity in the Chinese policy banks' African energy 'portfolio' tracked by Boston University's Global Development Policy Centre (2021b). Chinese engineering and construction companies are also seen to be less interested and less experienced in participating in market-driven procurement schemes like open auctions or FiTs, which tend to come with a higher equity-to-debt ratio and a very different risk profile than sovereign debt-backed construction contracts. South Africa's Renewable Energy Procurement Program (REIPPPP), for example, only saw around 2% of projects awarded to Chinese companies in the first four rounds of the programme²³ (Baker and Shen 2017: 13; Shen 2020: 12). When systems like FiTs are in place, Chinese contractors are also seen to prefer direct negotiations with authorities. This was the case, for example, in a 54MW solar PV project in Kenya, commissioned by Kenya in 2016, and financed by the China EXIM bank (Bhamidipati et al. 2021: 214).

An additional factor is the domestic and regional demand for renewable energy in China. Compared to fossil fuels and hydropower, solar and wind power are major growth sectors domestically. Recent Chinese greenhouse gas emissions targets, but also air pollution and health concerns are driving a rapid development of wind and solar power in mainland China (O'Meara 2020). In 2021, the country further tightened its target for non-fossil energy, calling for an increase from 15.8% (2020) to 20% in 2025 (Liu et al. 2021). This means that, while big players like China's Goldwind have a presence on the African continent, their primary focus remains firmly on domestic expansion, which is a lower risk environment, with strong government incentives and local authority support for project development (Shen 2020). Similarly, Chinese companies currently dominate the global market for manufacturing and supply of PV panels, accounting for over 70% of both solar cell and panel production, while China also controls more than 65% of the global raw material supply of polysilicon, needed for PV panel production (Bloomberg News 2020). China's producers supply panels to the world, but its engineering and construction firms seem less eager to move into equity finance and become owners of a large number of smaller scale solar projects (Chiyemura et al. 2021). This is a situation that may change in the coming years, as the domestic market matures and saturates, and Chinese companies gain more experience in the business models underpinning non-hydro renewable energy deployment.

Box 2: Understanding Chinese (development) finance

Chinese overseas infrastructure finance can be difficult to understand through the Organisation of Economic Cooperation and Development's (OECD) categories of development finance, and is often the subject of misconceptions on how Chinese organisations engage in Africa. The main Chinese DFIs are involved in both commercial activities and politically-driven cooperation and foreign aid. The China EXIM bank for example also has departments that issue concessional or even no-interest loans, while paradoxically the China Development Bank (CDB) does not (see Shen 2020). This can make it difficult to distinguish what Western observers consider development finance from purely commercial endeavours, especially since both also feature in a broad policy framework favouring outward infrastructure investment and connectivity.

China sees itself as a development partner, less as a traditional donor in the OECD sense of the word (Karkare et al. 2020). Chinese energy investments in Africa, even if they are informed by a broad developmental logic, therefore tend to have a predominantly commercial component. In the past decades, Chinese energy investment has also been subject to a clear expansion drive, particularly in the first years of the BRI (2013-18), which has increased the risk appetite of Chinese public and private financiers and contractors in a number of African countries. This was driven both by centralised policy directions, not least the 'going out' and BRI policies, supported by an international development narrative, but just as much by internal

²³ Compared to 67% European and 14% US based companies.

private sector (SOE) interests, looking to expand and consolidate, in a context of relative economic slowdown in mainland China and an overcapacity in the construction sector (IEA 2016).

Chinese creditors have sought to manage higher-risk infrastructure deals in a number of ways, including resource-backed infrastructure loans, in which infrastructure finance is secured by the proceeds of a set amount of resource exports. This was the case for example with the Bui Dam in Ghana, financed by the China EXIM Bank and partially secured with the exports of 30.000 metric tons of cocoa per year (at market price) until the dam became operational (AIDDATA n.d.). Chinese foreign lending in general has sought to put in place stronger safeguards, especially for larger loans (e.g. hydropower) and in higher-risk environments, turning to collateralisation with existing or future reserve assets put in escrow to minimise repayment risk.

Resource-backed or otherwise collateralized loans are often seen as a win-win arrangement by African and Chinese actors, but they have led to considerable criticism by Western policy-makers and analysts. The practice has fed a persistent, yet flawed, narrative of Chinese debt-trap diplomacy, portraying China as a loan shark with a hidden agenda of seizing strategic assets when lenders default, and developing countries as naive victims. While concerns about asset seizures in Africa have been consistently disproven²⁴ (Brautigam and Kidane 2020; Brautigam and Rithmire 2021), the 2020 economic crisis did show the limits of Chinese debt sustainability in an economic downturn. Angola, the poster child of resource-backed infrastructure finance, had to seek International Monetary Fund (IMF) support and temporary debt relief from Chinese creditors (Arnold and Strohecker 2021). Other countries in debt distress include Kenya, which received a six month debt repayment suspension from Chinese creditors in 2021 (Herbling 2021), and Zambia, which has the highest Chinese debt burden on the continent (Brautigam 2021).

Chinese creditors engage in debt restructuring, but they are traditionally wary of blanket announcements. They prefer to handle repayment issues on a case-by-case basis, and tend to reserve cancellation to limited zero-interest loans (Sun 2020). They also show increasing risk aversion, and a stronger risk management approach (Gelpern et al. 2021). This also suggests that Chinese infrastructure development finance in Africa is entering a new, and more cautious phase of the BRI, and it is unlikely to return to the same heights as before.

Chinese investment post-COVID: a smaller, greener BRI for Africa?

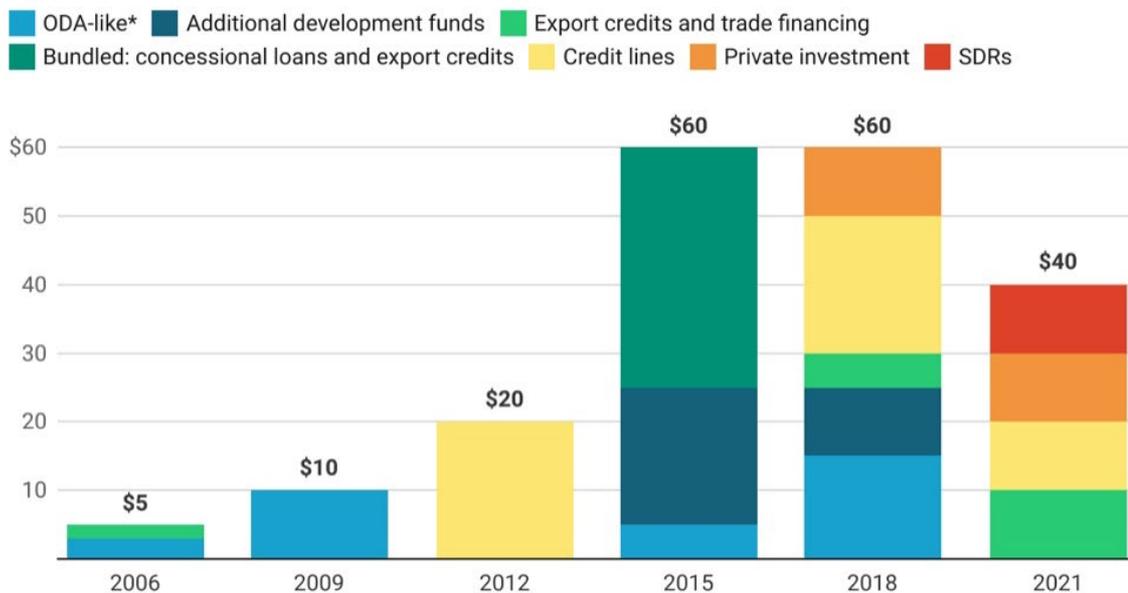
Chinese loans to the African power sector saw a steep rise starting in the mid 2000s (see figure 8). The COVID-19 and climate crises, however, have led to four fundamental shifts in Chinese finance that are often less well understood.

1. **Rebalancing the BRI:** 2020 saw one of the steepest drops in Chinese overseas finance. Investment into the countries of the BRI (worldwide) totalled USD 47 billion in 2020, which is 54% less than the year before, while Sub-Saharan Africa saw a decline in new commitments of 69% (Nedopil 2021a). Researchers also see a geographical rebalancing of Chinese overseas finance towards its more direct neighbourhood in East and West Asia (Nedopil and Yue 2021). For Africa, this may mean that the ‘honeymoon period’ of BRI finance is in the past, and that multi-billion dollars infrastructure deals will be more difficult to come by in the foreseeable future. In a context of growing debt distress on the continent, the willingness of Chinese creditors to underwrite large projects in high-risk environments will be lower than it was before. The China-Africa

²⁴ The narrative of Chinese predatory lending leading to asset seizures predates the Trump administration but found exceptionally fertile ground in its open anti-Chinese sentiment. While lack of transparency on Chinese loan data is a concern, the China-Africa Research Initiative (CARI) at the John Hopkins University has found no evidence of outright asset seizures in Africa, even in a context of increasing debt distress due to the COVID-19 crisis (Brautigam and Kidane 2020; Olander 2019).

summit (FOCAC) in November 2021 appeared to confirm this new phase, with less commitments in finance, and a stronger focus on vaccines and mutual trade (Cichocka and Gavas 2021).

Figure 10: China's FOCAC pledges in \$ billions



Source: Cichocka and Gavas 2021

2. **Dropping overseas coal:** In 2020, China made a number of critical announcements in terms of its own climate ambitions, setting a net-zero target for 2060, and integrating climate and energy more strongly in its 2021-2025 five-year plan. At the 2021 United Nations General Assembly (UNGA), ahead of COP26, Chinese president Xi Jinping also announced that China “will not build new coal-fired power projects abroad”. While many environmentalists expressed doubts about the forcefulness of the language, Chinese coal finance is already visibly fading out, marking a clear break with past practice. In the first half of 2021, no new coal projects were financed under the BRI (Nedopil 2021b). Across the continent, existing plans for new coal fired plants are also being reviewed as the global tide on coal appears to have turned. Early 2020, Egypt had already deferred plans for the 6000MW Hamrawein power plant, due to be constructed by a Chinese led consortium. The Industrial and Commercial Bank of China (ICBC) (China’s largest commercial bank) in July 2021 also announced it would not fund the \$3 Billion Sengwa Coal Power Plant in Zimbabwe (Olander 2021a), a controversial project that had come to symbolise Chinese investment in African coal.

3. **Maintaining renewable energy:** While the phasing out of Chinese coal finance is linked to the global backlash against coal fired power, the recent decision is also a result of the rapidly increasing competitiveness of solar and wind power in the past 10 years, coupled with a rising cost and greater risk of coal power (Nedopil 2021c). Data for BRI investment in the energy sector, also shows that the steep drop in the past two years is much less pronounced in the renewable energy sector, leading to hydropower, solar and wind accounting for 57% of Chinese energy investments in the BRI in 2020, compared to 38% in 2019 (Nedopil 2021a). These figures represent major investments outside of Africa, yet this trend will likely also affect energy finance in Africa in the coming years.

-
4. **Greening overseas investments and adopting ‘international standards’:** Chinese investments have long been criticised by European and Western creditors for applying insufficient environmental and social standards. China always upheld that it abides by host country jurisdictions and regulatory systems. In practice, this led to highly varied experiences across the continent. Future Chinese finance, however, may see a stronger central push towards green. In 2021, the Chinese Ministry of Commerce (MOFCOM) and Ministry of Ecology and Environment (MEE), for the first time, issued ‘Green development guidance for foreign investment and cooperation’, which explicitly calls for Chinese enterprises to adhere to “international green rules and standards”, and a project lifecycle approach to greening overseas investment (Nedopil and Tang 2021). In January 2022, these were followed up with ‘Guidelines for ecological environmental protection of foreign investment cooperation and construction projects’, which further describes how (public and private) companies should integrate international and Chinese environmental considerations along the whole project lifecycle. The guidelines also call for prioritising “clean and green renewable energy projects” in the energy sector (Nedopil 2022; MEE 2022). While the full implications of these guidelines will depend on their effective application, these developments signal a clear ambition of China to do more than lead on clean energy from the back.

Overall, while the bulk of recent Chinese investments in African energy appears to continue its focus on Engineering Procurement and Construction (EPC) contracts for utility-scale generation, transmission and distribution, future investments may increasingly shift away from this model, and towards renewable energy and solar and wind power in particular. Current Chinese presence in competitive renewable energy procurement schemes like in South Africa remains limited, yet as the prospects for African wind and solar continue to grow, and Chinese contractors gain more experience in competitive bidding for renewable energy projects, this could increase. Chinese companies could also seek to leverage their dominance in the PV panel supply chain to increase their competitive offer in the decentralised solutions segment²⁵.

The greening of Chinese overseas investment is at the early stages, yet recent developments suggest its energy finance, in addition to the phase-out of coal, will be at the centre of China’s bid for green leadership. The introduction of stronger (internationally aligned) Chinese standards for overseas investment can bring Chinese overseas energy interests closer to those of European and US counterparts, and can contribute to scaling solar and wind at a time when African demand is growing considerably. Moving beyond a light-touch implementation of green standards, however, will require a considerable change in course of Chinese finance to African infrastructure. Sovereign debt sustainability in particular is a major concern for Chinese infrastructure investments, which rely heavily on government borrowing at a time when debt service commitments are reaching new heights (Heitzig et al. 2021). In absence of a stronger push for competitive bidding by Chinese contractors, it may impose significant limits on Chinese clean energy finance in the near future.

Box 3: Other key and ‘emerging’ players in African energy

Apart from China, the EU and multilateral DFIs, several other players are active in the African energy space. While their relative footprint remains well below European, Chinese, and multilateral finance, these countries have all explicitly expressed an interest in African energy development. Their ability to grow their ‘market share’ on the continent very much depends on domestic energy transition and political and economic dynamics.

²⁵ Chinese company BeeBeeJump, for example, offers PayGo services in Nigeria, and is looking to expand into several other African markets (Global Times 2021).

United States:

The most notable US initiative is Power Africa, a large-scale Private Public Partnership (PPP) launched in 2013 under Barack Obama's presidency. While US ODA for African energy is significantly lower than the EU's aggregate contribution, PowerAfrica is a highly visible 'one-stop-shop' initiative. The US' energy interests are currently firmly focused on its domestic transition. Through the G7's B3W initiative, the US has renewed its interest in overseas infrastructure, however, experts raise doubts about US actors' technical capacity, and the country's ability to sustain large-scale initiatives across administrations (Olander 2021b; Sinica 2021).

India:

While India's current energy cooperation with Africa is largely focused on hydrocarbons, the country has shown a clear appetite to shift cooperation towards renewables (Ray Dadwal 2020; IRENA 2019). In 2015, for example, it launched an International Solar Alliance through which it hopes to use solar diplomacy to foster deeper trade and political partnerships with developing countries (IRENA 2019). At the same time, India is going through a major energy crisis at home, and is internationally seen to step on the brakes of a global coal phase-out. However significant its renewable energy expansion plans domestically are, internal constraints will limit its ability to compete abroad.

Gulf countries:

Countries like Saudi Arabia, the United Arab Emirates and Qatar, and the Islamic Development Bank (IDB) have long supported infrastructure development, particularly in West and North Africa, including hydropower (Medinilla 2017). While lagging behind in the renewable energy transition, several Gulf countries have started investing oil revenue in developing clean technology and renewable energy (Whiteaker 2021). SOEs like Saudi Arabia's ACWA Solar have also invested in fairly large-scale projects overseas, including in Egypt and South Africa (Casey 2021).

Russia:

While it lacks financial power, Russia is trying to (re-)build its influence and presence in Africa (Foy et al. 2019). Russia has interests in oil and gas exploration in (North) Africa, yet its main comparative advantage is in nuclear energy (Mpungose 2019). By 2019, 12 countries were negotiating with Russia on nuclear cooperation, including Egypt, Nigeria and South Africa (Mpungose 2019).

Turkey:

Turkey has long sought to intensify its trade relations with Africa (Tavsan 2021). In recent years, the country has made steady progress in reducing carbon emissions of its domestic power sector, both with a solar PV auctions scheme and nuclear (IEA 2021a). As a small and emerging player in the African energy space it is perhaps best known for providing mobile (floating) oil/gas fired power plants to several African countries (Collins 2021). However, Turkish businesses are also seen to invest in renewable energy, particularly solar power (Takouleu 2021). The current economic and monetary crisis in Turkey, however, will likely stall outward investment growth for a number of years.

3. Reality check: competing models or parallel worlds?

The dominant narrative in European policy circles suggests a looming race for opportunities in African green infrastructure. A closer look at European and Chinese investment, however, reveals that this perception of increasing direct ‘competition’ between may be somewhat overblown. In reality, EU and Chinese actors have long used fundamentally different business models for African energy infrastructure, and have been working more in parallel than in competition in many countries.

The EU and EU member states’ footprint is based on a developmental objective, and the use of public funding to crowd in private finance and capital focusing on competitive, IPP-based renewable energy and decentralised solutions. Fragmentation of EU institutions, EU DFIs, and EU member states engagement, however, also means that it can be less visible compared to others. China has in a short timespan extended massive amounts of credit to governments, focusing on constructing large scale fossil fuel, hydropower, and interconnection infrastructure. The rapid rise of Chinese investment in the 2013-2018 period is behind much of the apprehension in European circles. However, more recently there has been a steep drop in Chinese infrastructure commitments in Africa, which is unlikely to bounce back to the levels of the 2010s.

In the coming years, we will likely see an increasing convergence of the two models, primarily driven by changes in Chinese practice and the greening of overseas investment from both European and Chinese actors. The following four dynamics are especially relevant when looking at Africa’s renewable energy sector:

1. **The BRI is a living and learning policy.** Chinese SOEs –its leading overseas actors– are adapting to a greener environment. Sovereign debt-financed EPC contracts will continue to make sense for large-scale hydropower and some utility-scale solar/wind, but less so in a context of shrinking fiscal space and rapid development of market-driven renewable energy mechanisms. As the Chinese domestic solar and wind sector matures in the coming years, Chinese companies may increasingly seek to leverage their dominance in PV production and rich experience abroad, and diversify their business model to participate in competitive African renewable energy procurement schemes.
2. **Cooperation between EU and Chinese companies on the ground may create opportunities.** Anti-Chinese sentiment can close more doors than it opens. In the renewable energy sector, it does not need to be one or the other. The old narrative of unsustainable and low-value added Chinese engagement vs slow and bureaucratic Western donors, does not apply in a context of country-driven open procurement schemes. Chinese corporations have a distinct edge in technology provision (particularly solar), and have considerable contracting ability. European companies and development partners in turn have a long track record of innovative (blended) finance, and technical and regulatory reform assistance. All these elements are needed to accelerate and scale renewable energy deployment.
3. **Renewable energy investment barely scratches the surface of what is needed and what is possible.** Recent European and US narratives on Chinese infrastructure development seem to suggest that there is a finite number of opportunities the ‘two sides’ are competing for. The need for expanding generation and transmission capacity, as well as decentralised solutions outstretched the current available overseas investment flows many times over. While there are structural barriers to renewable energy expansion, not linked to theoretical demand for electricity, the long-term picture, especially based on ambitious projections like those of the IEA (2019), will require a significant change in scale both from Western partners and China.

4. **African demand for scaling overseas energy investment is strong.** The pull factor for renewable energy investments is critical. African governments will likely continue to look towards China for EPC contracts for hydropower dams, most of which are decades-old national priority projects, but also for leveraging African natural gas reserves in the short to medium term. As the long-term prospects and affordability of renewable energy continue to improve, African demand is also increasingly shifting towards renewable energy. Research shows that African governments tend to see China as a preferred partner for infrastructure development, and that both Chinese contractors and Chinese technology are also seen in a favourable light (Chiyemura et al. 2021: 14). At the same time, there is a growing recognition that continued debt-financing is not a viable option for scaling African electricity supply, which means that demand also moves more towards market-driven procurement, where European actors have traditionally been more active.

3.1. Renewable energy segments to watch

A lot of research into foreign energy finance is focused on utility-scale capacity. This is partly because the financial flows and projects tend to be easier to track, partly because other segments have only recently started scaling up. To better understand competition and prospects for European support, however, one has to look at the full spectrum of renewable energy segments, each of which come with different financial breakdown, but also a different risk profile and different foreign and domestic interests. While detailed analysis is beyond the scope of this paper, figure 11 below gives a brief overview of critical trends to follow in the coming years.

Table 1 Key renewable energy segments in Africa

Segment	Key features	Finance and risk factors	Notable foreign players
Large-scale hydropower	<ul style="list-style-type: none"> • High political priority nationally, regionally and continentally • Highest upfront costs; long-term horizon • Considered less 'renewable' and less desirable by Western environmental groups and donors 	<p>Modalities: Large sovereign debt component</p> <p>Common risk factors:</p> <ul style="list-style-type: none"> • Repayment risk; debt sustainability • Long-term sometimes decades-long delays • Reputational damage (environmental and social aspects) 	<p>CN: debt-financed EPC contracts; significant footprint of SOEs like Sinohydro (PowerChina) and Three Gorges Corporation (TGC)</p> <p>World Bank Group (WBG) and EU DFIs: Historical presence; tightening standards and growing reluctance</p>
Utility scale renewables <i>Solar power</i> <i>Wind power</i> <i>(Geothermal)</i>	<ul style="list-style-type: none"> • Growing political priority in many countries; virtually limitless potential for solar (and wind) • Requires shift towards a more modular energy systems 	<p>Modalities: Private debt, DFIs, equity</p> <p>Common risk factors:</p> <ul style="list-style-type: none"> • Offtaker risks (dysfunctional utilities, grid capacity, infrastructure deficiencies) • Regulatory environment risks • (Private) debt repayment risks 	<p>CN - Limited but growing participation of SOEs</p> <p>EU - Significant presence; focus on solar and wind; EDFIs and blended finance</p> <p>US - Accelerated investment since Power Africa (2013)</p>

	<ul style="list-style-type: none"> Scaling through competitive procurement, IPPs, FiTs 	<ul style="list-style-type: none"> Political and economic stability risks 	
<p>Decentralised solutions</p> <p><i>Off-grid solar</i> <i>Mini-grid solar</i> <i>Systems</i> <i>Solar Home Systems</i></p>	<ul style="list-style-type: none"> Alternative to 'rural electrification' through subsidised grid expansion; Various modalities; growing pay-as-you-go (PAYGo) adoption Scalability depends on productive use cases (SMEs) 	<p>Modalities: Equity, grant/subsidies, private debt; increasing DFI involvement</p> <p>Common risk factors:</p> <ul style="list-style-type: none"> Consumer risk (sufficient productive use) Regulatory environment risks (e.g. tariffs) Policy uncertainty (e.g. long-term electrification plans) 	<p>CN - Dominant in technology provision, limited presence in installations and services</p> <p>EU - Growing EDFI investment; Significant footprint and ongoing consolidation led by large energy companies (e.g. recent ENGIE acquisitions)</p>

3.2. Longer-term dynamics of green transition

The clean technology space is evolving quickly. Two key trends will likely shape Africa-EU cooperation in the mid-to long term, and are likely to become important African priorities:

- 1. African green hydrogen (North Africa):** The EU's 2020 hydrogen strategy proposed a staged approach to developing mature hydrogen applications in a range of sectors by 2050 (EC 2020), and lists green hydrogen imports from North African solar electrolyzers as a potentially highly cost-effective solution, and one that can reduce reliance on highly controversial low carbon and 'blue hydrogen'²⁶. While some see green hydrogen as an opportunity for African exporters to benefit from the EU's industrial transition (Usman et al 2021), others point to the risks of a continued extractiveist agenda and green neocolonialism (Hamouchene 2021). In an optimist scenario, green hydrogen could also contribute to a so-called African 'renewables pull', where heavy industries like steel and chemicals relocate where concentrated green energy is most affordable and available (Martin 2021). The use-case for hydrogen is still very much in active development, and while some projects are underway, hydrogen solutions are not yet cost effective, nor is there significant current demand. Projects will therefore rely on research and development (R&D) and public innovation funding for the foreseeable future, yet the AEEP estimates that European Foreign Direct Investment (FDI) for African green hydrogen according to stated policy ambitions could total up to €90 billion by 2030 (van den Bergh 2020).
- 2. African critical raw materials (South Africa, DRC, Mozambique, etc.²⁷):** Green transition is redrawing the map of raw material supply and demand worldwide. Battery technology in particular, relies heavily on mined resources like lithium and cobalt. Much like PV panels, the production of Lithium-Ion batteries is dominated by China, which also controls a sizable portion of mineral production (particularly lithium and graphite), and the majority of mineral processing (Umbach 2021). Chinese companies have sought to consolidate access to African Cobalt (primarily from The Democratic Republic of Congo (DRC)) and reportedly currently control nearly 70% of DRC cobalt production, yet (Kinch 2020). European demand for lithium may multiply up to 60 times by 2050,

²⁶ For a discussion on the EU's hydrogen interest and strategy, see: Fisher and Skillings 2020.

²⁷ South Africa, DRC and to a lesser extent Mozambique are currently the biggest African producers of green CRMs, yet the list of potentially big future exporters is much larger. See for example ANRC 2021.

and graphite and cobalt up to 15 (Bobba et al. 2020), and the EU is looking to secure resources both at home and abroad (Umbach 2021). While African countries hold significant resources, and may be able to further boost income from royalties, processing currently takes place abroad. This also risks confining African countries to the extraction stage of green technology value chains. Opportunities for building African-based supply chains exist, but will require levels of investment and regional cooperation that are currently absent. As EV use and battery storage markets continue to expand, there may also be opportunities for circular economy applications through reuse and recycling in African countries.²⁸

Recommendations for Africa-EU renewable energy cooperation

In the past few years, the notion of geopolitical competition has permeated all areas of EU external action, this is especially true for foreign infrastructure and energy diplomacy. The EU's 'geopolitical' narrative reflects a more acute awareness that its internal political project depends on the economic success and credibility of Europe globally. Recent initiatives like the GGI project a new yet often criticised rhetoric of the EU, one in which it asserts itself as a more openly strategic power, while also doubling down on its normative narrative of value-driven international partnerships.

Looking at renewable energy in Africa, the dominant rhetoric appears to suggest a greater level of direct competition than currently exists. In reality, rather than a battleground between great powers, we observe that the needs and demands for external infrastructure finance vastly overstretch the offer of any foreign partner. At the same time, it is clear that between now and 2030 we will see a phase of rapidly expanding overseas renewable energy interests, which are largely driven by domestic dynamics and economic interests relating to energy transition in Europe, China and beyond. The EU seeks to develop new and green technologies to accelerate its own transition, and will use public funding and its regulatory power to carve out its long-term vision of a regionally interconnected and technology-driven green growth. China, in turn, is the biggest renewable energy market globally. It dominates the manufacturing and critical raw materials value chains for both PV and battery storage, and will likely increasingly seek to leverage this overseas.

Africa's energy systems are now seen as an opportunity more than a development challenge, even if structural barriers continue to prevent the rapid scaling of both domestic and foreign investment needed to sustainably power the continent's economies. For the EU and its member states to gain the credibility they hope to project in African renewable energy, and to create the opportunities they claim to bring, the EU will need to adapt both its narrative and its business model:

A less defensive narrative

1. Focus on substance, not competition

The 'geopolitical competition' narrative is of little use in Africa. Instead of presenting the EU's investment as an alternative to buy into, the EU and its member states should focus on the substance of their offer, and use their Team Europe 'branding' to establish a clear and unified EU-plus-member states narrative on the potential benefits of the European Green Deal for African countries, the value of interconnected energy systems, green jobs and a green economic development.

²⁸ For a discussion on circular economy considerations for EV battery technology, see Drabik and Rizos 2018.

2. Emphasise 'just transition' over 'value-driven' investment

'Value-driven cooperation' means relatively little for infrastructure development, and is reminiscent of the invasive conditionalities and bureaucratic burden of past EU development cooperation. The European Green Deal is already seen as a potentially punitive project in Africa. The EU therefore has an interest in more consistently adopting a just transition narrative outside its borders, particularly focusing on fossil-fuel dependent economies in Africa that are set to lose out in a global energy transition. High-profile initiatives like the Just Energy Transition Partnership with South Africa, are important first steps. An explicit just transition objective (with matching resources) would also be a very useful entry point for targeted Team Europe actions in North African countries and key fossil fuel exporters like Nigeria.

3. Respect alternative decarbonisation trajectories

Many African countries are setting ambitious decarbonisation targets, yet also hope to rely on energy sources the EU is less keen to finance, like large-scale hydropower, natural gas, and nuclear. EU energy diplomacy should be careful not to dismiss key national priorities, and EU support to renewable energy should be seen to enable, and not slow down the industrialisation objectives of African countries.

4. Use key diplomatic opportunities

The AU-EU summit in 2022 is a unique opportunity for EU green deal diplomacy, and for clarifying the EU's future offer of renewable energy investment. This should include a clear action plan for what the GGI means for Africa. AU-EU political dialogue also offers an opportunity for developing a joint commitment to just transition, backed by ideally a series of ambitious Team Europe initiatives. The implementation of the new EU programming cycle is also a unique opportunity to increase the visibility of EU support, and establish a lasting portfolio of high-profile and Team Europe-branded renewable energy initiatives across the continent.

A stronger and more attractive business model

5. Scale, speed and value for money

African governments are first and foremost looking to quickly, and effectively develop their energy capacity. Chinese contractors are able to deliver large-scale projects at record speeds, and are often preferred for their flexibility. Scaling up the EU's DFI and privately financed offer will require investing in efficiency and responsiveness as much as in scale and value for money.

6. Look for complementarity instead of competition

Scaling renewable energy through centralised debt-financed infrastructure is becoming less viable and will increasingly rely on competitive bidding. African countries are moving towards IPPs for utility-scale renewables, which creates opportunities for a more virtuous competition between different foreign investors and DFIs. At the same time, scaling on- and off-grid solar will also depend on procurement from leading Chinese manufacturers. In this context, EU actors have an interest in pursuing mutually beneficial cooperation, building on the respective strengths and specific market access of both sides.

7. Addressing structural barriers and risk factors

Guarantees and other instruments are key to bring private finance across, but they cannot produce the further structural reforms and market conditions needed for renewable energy to thrive. The EU, through its international cooperation has a certain edge in supporting sectoral development, accompanying regulatory

reforms and renewable energy integration at the national level, and is well placed to prioritise²⁹ this through continental, regional and national channels.

8. Further address fragmentation and visibility

The EU's 'offer' of renewable energy is becoming clearer, but it is still far from a one-stop-shop. The first generation of Team Europe Initiatives and the EU institutions own NDICI programming will be essential to build visibility and credibility of the EU as a renewable energy actor. As investment picks up in the coming years, the EU can also make better use of its combined diplomatic architecture for establishing a clear and accessible European offer and creating new opportunities.

9. Invest in new green jobs early on

Renewable energy is largely an import-driven business, with manufacturing currently dominated by Chinese manufacturing, and the EU investing heavily in its own green industry. Part of the credibility of the EU as a renewable energy player will also depend on its ability to support new green job creation abroad, beyond low-skilled construction jobs. The EU-Africa partnership can help pave the way towards green technology manufacturing and assembly. Investing in new green industrial hubs around battery-electric vehicles, manufacturing of solar and decentralised solutions, but also emerging technologies like green hydrogen and low-carbon heavy industry (e.g. cement) can be essential building blocks for an interconnected green economy. This will also require working with African expertise and private sector on research and innovation in those areas, an existing, yet difficult to implement priority of the AU-EU partnership.

²⁹ For a discussion on circular economy considerations for EV battery technology, see Drabik and Rizos 2018.

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